STEEL STRONG-WALL®: *Cold-Formed Steel on Concrete Foundations*

SIMPSON Strong-Tie®

The Steel Strong-Wall® provides high-capacity, narrow wall solutions for cold-formed steel framing. The wall installs easily in cold-formed steel framing, and pre-attached steel studs allow easy attachment of interior and exterior finishes.

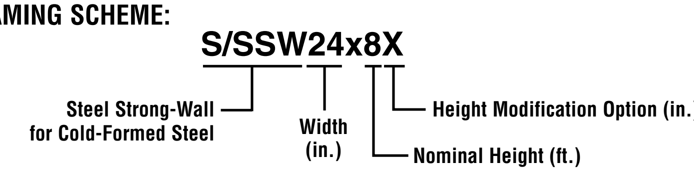
MATERIAL: Vertical Panel—118 mil (10 ga)

FINISH: Vertical Panel—Galvanized
Top and Base Plates—Simpson Strong-Tie gray paint
(cold galvanizing available, contact Simpson Strong-Tie)

NOTES:
- For top-of-wall attachment, use ¼" or #14 self-drilling screws *(not provided)* extended through the connection with 3 exposed threads minimum. Fill all screw holes.
- Maximum height H is the maximum height allowed for the allowable shear loads.

CODES: ICC-ES ESR-1679; City of L.A. RR 25625; State of Florida FL5113

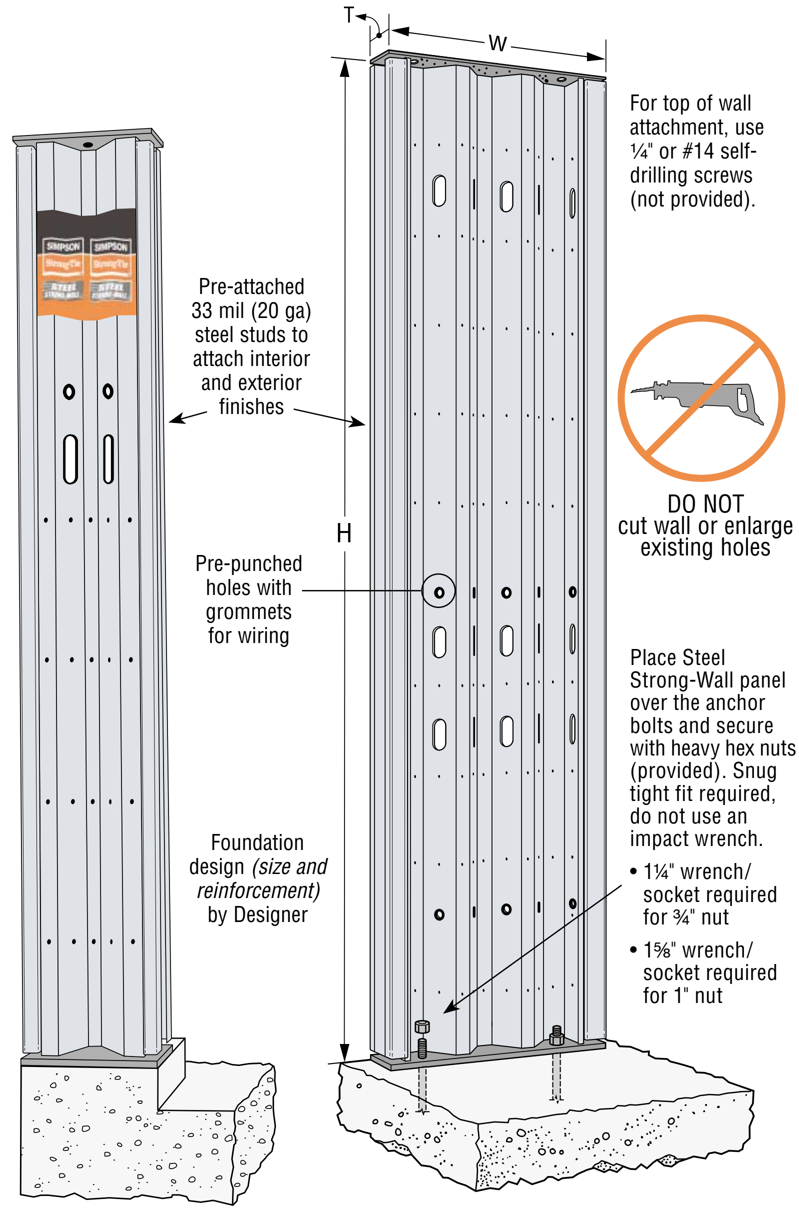
NAMING SCHEME:



STEEL STRONG-WALL FOR COLD-FORMED STEEL PRODUCT DATA

Model No.	W (in)	Max. H[1] (in)	T (in)	Anchor Bolts		Number of Screws in Top of Wall
				Qty.	Dia.	
S/SSW12x7	12	80	3½	2	¾"	4
S/SSW15x7	15	80	3½	2	1"	6
S/SSW18x7	18	80	3½	2	1"	9
S/SSW21x7	21	80	3½	2	1"	12
S/SSW24x7	24	80	3½	2	1"	14
S/SSW12x8X	12	97	3½	2	¾"	4
S/SSW15x8X	15	97	3½	2	1"	6
S/SSW18x8X	18	97	3½	2	1"	9
S/SSW21x8X	21	97	3½	2	1"	12
S/SSW24x8X	24	97	3½	2	1"	14
S/SSW12x9X	12	109	3½	2	¾"	4
S/SSW15x9X	15	109	3½	2	1"	6
S/SSW18x9X	18	109	3½	2	1"	9
S/SSW21x9X	21	109	3½	2	1"	12
S/SSW24x9X	24	109	3½	2	1"	14
S/SSW15x10X	15	121	3½	2	1"	6
S/SSW18x10X	18	121	3½	2	1"	9
S/SSW21x10X	21	121	3½	2	1"	12
S/SSW24x10X	24	121	3½	2	1"	14

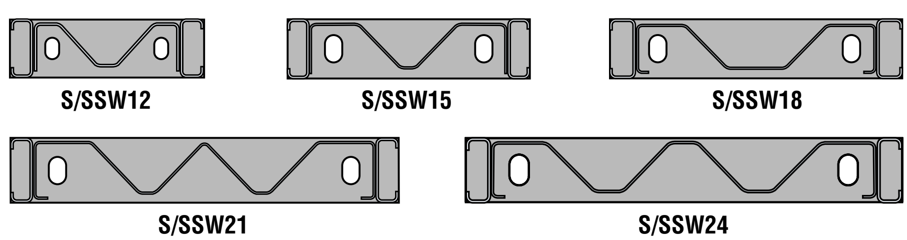
1. Specify height when ordering “X” models *(example: S/SSW12x8X, H = 95")*.



S/SSW12x8X

S/SSW24x10X
Patent Pending

WALL PROFILES



2006 INTERNATIONAL BUILDING CODE®

S/SSW Model	Max. H (in.)	Allowable Axial Load (lbs)	Seismic[2]			Wind		
			Allowable ASD Shear Load V (lbs)	Drift at Allowable Shear (in)	Uplift at Allowable Shear[6] (lbs)	Allowable ASD Shear Load V (lbs)	Drift at Allowable Shear (in)	Uplift at Allowable Shear[6] (lbs)
S/SSW12x7	80	1000	845	0.35	8460	1070	0.44	11405
		4000	845	0.35	8460	1060	0.44	11265
		7500	845	0.35	8460	885	0.37	8950
S/SSW15x7	80	1000	1645	0.34	13340	1810	0.38	15135
		4000	1640	0.34	13290	1640	0.34	13290
		7500	1440	0.30	11290	1440	0.30	11290
S/SSW18x7	80	1000	2800	0.33	18690	3375	0.40	24545
		4000	2800	0.33	18690	3250	0.38	23135
		7500	2800	0.33	18690	2980	0.35	20370
S/SSW21x7	80	1000	4050	0.32	22590	4440	0.35	25710
		4000	4050	0.32	22590	4440	0.35	25710
		7500	4050	0.32	22590	4310	0.34	24635
S/SSW24x7	80	1000	5250	0.30	24710	5250	0.30	24710
		4000	5250	0.30	24710	5250	0.30	24710
		7500	5250	0.30	24710	5250	0.30	24710
S/SSW12x8X	97	1000	645	0.42	7710	820	0.54	10360
		4000	645	0.42	7710	775	0.51	9640
		7500	610	0.40	7220	610	0.40	7220
S/SSW15x8X	97	1000	1280	0.42	12390	1415	0.47	14090
		4000	1250	0.41	12025	1250	0.41	12025
		7500	1070	0.35	9955	1070	0.35	9955
S/SSW18x8X	97	1000	2140	0.41	16895	2785	0.54	24565
		4000	2140	0.41	16895	2680	0.52	23130
		7500	2140	0.41	16895	2460	0.48	20400
S/SSW21x8X	97	1000	3265	0.41	21905	3870	0.48	27930
		4000	3265	0.41	21905	3765	0.47	26790
		7500	3265	0.41	21905	3460	0.43	23715
S/SSW24x8X	97	1000	4540	0.39	26335	4985	0.43	30045
		4000	4540	0.39	26335	4890	0.42	29220
		7500	4540	0.39	26335	4555	0.39	26455
S/SSW12x9X	109	1000	545	0.48	7255	695	0.61	9735
		4000	545	0.48	7255	605	0.53	8210
		7500	445	0.39	5755	445	0.39	5755
S/SSW15x9X	109	1000	1090	0.48	11725	1180	0.52	12955
		4000	1025	0.45	10875	1025	0.45	10875
		7500	850	0.37	8720	850	0.37	8720
S/SSW18x9X	109	1000	1835	0.47	16105	2365	0.61	22835
		4000	1835	0.47	16105	2365	0.61	22835
		7500	1835	0.47	16105	2150	0.55	19890
S/SSW21x9X	109	1000	2800	0.46	20855	3275	0.54	25900
		4000	2800	0.46	20855	3025	0.50	23140
		7500	2735	0.45	20220	2735	0.45	20220
S/SSW24x9X	109	1000	4005	0.46	26025	4220	0.48	27970
		4000	3950	0.45	25540	3950	0.45	25540
		7500	3630	0.41	22855	3630	0.41	22855
S/SSW15x10X	121	1000	945	0.53	11185	990	0.56	11845
		4000	835	0.47	9645	835	0.47	9645
		7500	665	0.37	7425	665	0.37	7425
S/SSW18x10X	121	1000	1605	0.53	15515	2045	0.67	21490
		4000	1605	0.53	15515	1960	0.64	20225
		7500	1605	0.53	15515	1715	0.56	16890
S/SSW21x10X	121	1000	2440	0.52	19970	2650	0.56	22275
		4000	2405	0.51	19600	2405	0.51	19600
		7500	2120	0.45	16730	2120	0.45	16730
S/SSW24x10X	121	1000	3425	0.50	24275	3425	0.50	24275
		4000	3160	0.46	21875	3160	0.46	21875
		7500	2855	0.42	19275	2855	0.42	19275

NOTE:
For models with an "X" suffix, specify height when ordering *(example: S/SSW12x8X, h=95").*

1. Allowable shear loads and anchor uplifts are applicable to installation on concrete with minimum f'_C = 2500 psi using the ASD basic (Section 1605.3.1) or the alternative basic (Section 1605.3.2) load combinations. Load values include evaluation of bearing stresses.
2. For seismic designs based on the 2006 IBC using R = 6.5. For other codes, use the seismic coefficients corresponding to light-frame bearing walls with wood structural panels or sheet steel panels.
3. Top-of-wall screws for the S/SSW shall be approved ¼" or #14 self-drilling screws with a minimum nominal shear strength (Pss) of 2000 lbs. Top of panel shall be connected to a minimum 43 mil (18 ga) thick steel member typical. S/SSW18 and wider panels up to 97 inches tall require connection to a minimum 54 mil (16 ga) thick steel member. When connected to a minimum 43 mil (18 ga) thick steel member, the allowable load shall be limited to 2720 lbs. for S/SSW18, 3625 lbs. for S/SSW21, and 4230 lbs. for S/SSW24.
4. Allowable shear, drift, and uplift values may be interpolated for intermediate height or axial loads. See example on page 42.
5. High-strength anchor bolts are required for anchor tension (uplift) forces exceeding the allowable load for standard-strength bolts tabulated on pages 50–51. See pages 50–54 for SSWAB anchor bolt information and anchorage solutions.
6. Tabulated anchor tension (uplift) loads assume no resisting axial load. For anchor tension loads at design shear values and including the effect of axial load, refer to the Strong-Wall Selector™ software or use the equations on page 43. Drifts at lower design shear may be linearly reduced.
7. See page 42 for allowable out-of-plane loads and axial capacities.

ALLOWABLE OUT-OF-PLANE LOADS (PSF)[1,3]

Model Width	Axial Load (lbs)[2,4]	Nominal Height of Panel (feet)		
		8	9	10
12" wide	1000	195	140	100
	4000	145	100	70
	7500	85	50	25
15" wide	1000	160	125	100
	4000	130	95	70
	7500	90	65	45
18" wide	7500	300	210	155
21" wide	7500	255	180	130
24" wide	7500	265	190	135

1. Loads shown are at ASD level in pounds per square foot (psf) of wall with no further increase allowed and are applicable to either the ASD Basic or Alternative Basic load combinations.
2. Axial load denotes maximum gravity load permitted on entire panel acting in combination with the out-of-plane load.
3. Load considers a deflection limit of h/240.
4. Allowable out-of-plane loads for the 12- and 15-inch walls may be linearly interpolated between the axial loads shown.

AXIAL CAPACITIES ON CONCRETE

Model Width	Compression Capacity (lbs) with No Lateral Load[1,2,3]			
	Nominal Height of Panel (feet)			
	7	8	9	10
12" wide	20200	16300	13700	11100
15" wide	25300	21800	19200	16600
18" wide	42500	36000	31400	27000
21" wide	43700	35800	30300	25100
24" wide	51600	42900	36900	31100

1. Compression capacity is lesser of wall-buckling capacity or 2500 psi uniform concrete bearing.
2. Compression capacity of wall assumes concentric loading with no lateral loads present. See allowable in-plane or out-of-plane shear load tables for combined lateral and axial loading conditions.
3. Capacities are applicable to either the ASD Basic or Alternative Basic load combinations.

S/SSW SHEAR LOAD INTERPOLATION EXAMPLE

Given:

2006 IBC, Seismic, 2500 psi Concrete

Shear Load = 2000 lbs.

Axial = 4000 lbs.

S/SSW Wall Height Required: 8'-6" = 102"

Interpolate (See table on page 30):

S/SSW18x8X V_1 = 2140 lbs., h_1 = 97"

S/SSW18x9X V_2 = 1835 lbs., h_2 = 109"

Equation: $V_{allow} = \left(\frac{V_1 - V_2}{h_1 - h_2}\right)(h_{required} - h_1) + V_1$

$$V_{allow} = \left(\frac{2140\text{ lbs.} - 1835\text{ lbs.}}{97" - 109"}\right)(102" - 97") + 2140\text{ lbs.} = 2013\text{ lbs. @ }102"$$

V_{allow} = 2013 lbs. > 2000 lbs. **<u>OK</u>**

››› Use S/SSW18x9X H = 102"

EQUATIONS FOR CALCULATING UPLIFT FORCES AT BASE OF FIRST-STORY WALL

(Based on limiting concrete bearing on a 3½" wide base plate at the edge of the concrete)

These equations may be used to calculate uplift forces at the base of the 1st-story wall to aid Designers in developing anchorage solutions other than those shown on pages 50–54.

NEW Equations have been revised and are based on a rectangular compression stress block.

2.5 ksi concrete

12 in. wall $\mathbf{T} = \left[28.1 - \sqrt{788 - 5.95\,(3.4P + Vh)}\right] - P$

15 in. wall $\mathbf{T} = \left[36.1 - \sqrt{1301 - 5.95\,(4.6P + Vh)}\right] - P$

18 in. wall $\mathbf{T} = \left[45.0 - \sqrt{2025 - 5.95\,(6.1P + Vh)}\right] - P$

21 in. wall $\mathbf{T} = \left[53.9 - \sqrt{2908 - 5.95\,(7.6P + Vh)}\right] - P$

24 in. wall $\mathbf{T} = \left[62.8 - \sqrt{3950 - 5.95\,(9.1P + Vh)}\right] - P$

3.0 ksi concrete

12 in. wall $\mathbf{T} = \left[33.7 - \sqrt{1135 - 7.14\,(3.4P + Vh)}\right] - P$

15 in. wall $\mathbf{T} = \left[43.3 - \sqrt{1874 - 7.14\,(4.6P + Vh)}\right] - P$

18 in. wall $\mathbf{T} = \left[54.0 - \sqrt{2916 - 7.14\,(6.1P + Vh)}\right] - P$

21 in. wall $\mathbf{T} = \left[64.7 - \sqrt{4187 - 7.14\,(7.6P + Vh)}\right] - P$

24 in. wall $\mathbf{T} = \left[75.4 - \sqrt{5688 - 7.14\,(9.1P + Vh)}\right] - P$

4.5 ksi concrete

12 in. wall $\mathbf{T} = \left[50.5 - \sqrt{2554 - 10.71\,(3.4P + Vh)}\right] - P$

15 in. wall $\mathbf{T} = \left[64.9 - \sqrt{4216 - 10.71\,(4.6P + Vh)}\right] - P$

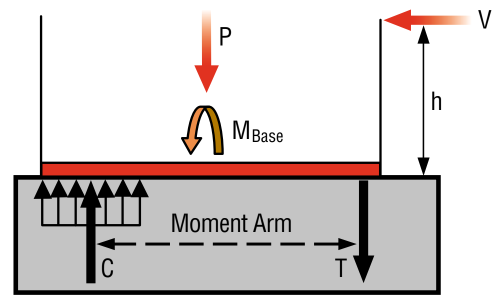
18 in. wall $\mathbf{T} = \left[81.0 - \sqrt{6560 - 10.71\,(6.1P + Vh)}\right] - P$

21 in. wall $\mathbf{T} = \left[97.1 - \sqrt{9421 - 10.71\,(7.6P + Vh)}\right] - P$

24 in. wall $\mathbf{T} = \left[113.1 - \sqrt{12{,}797 - 10.71\,(9.1P + Vh)}\right] - P$

Notes:

1. Equations may be used to calculate uplift forces at the base of first-story walls on concrete foundations.
2. Equations are based on the design methodology contained in AISC Steel Design Guide 1 – Base Plate and Anchor Rod Design, second edition using a rectangular compression stress block.



Forces at Base of Wall

T = Resulting anchorage tension (uplift) force (kips)
V = Design shear (kips)
P = Total vertical load (kips)
h = Wall height (inches)

For two-story stacked applications, substitute M_{base} for Vh:

$$Vh = M_{base}\left(\frac{12}{1000}\right)\ \text{kip-in}$$

Where M_{base} = Design moment at base of wall (ft-lbs)

EXAMPLE 1 – Single-Story S/SSW:

Given:

- S/SSW18x9X wall on 2.5 ksi concrete
- 2006 International Building Code®, Seismic
- Design Shear (V) = 1.5 kips < 1.835 kips ($V_{allowable}$)
- P (Vertical Load) = 1.0 kip
- h = Wall height = 109"

$$\mathbf{T} = \left[45.0 - \sqrt{2025 - 5.95\,(6.1P + Vh)}\right] - P$$

$$\mathbf{T} = \left[45.0 - \sqrt{2025 - 5.95\,(6.1 \times 1 + 1.5 \times 109)}\right] - 1.0 = \underline{\underline{12.1\ \text{kips}}}$$

EXAMPLE 2 – Two-Story Stacked S/SSW Condition:

Given:

- See Two-Story Design Example on page 49
- S/SSW18x9X-STK wall on 2.5 ksi concrete
- 2006 International Building Code®, Wind
- M_{base} = 17,550 ft-lbs. (Moment at base of two-story stacked wall)
- $Vh = 17{,}550 \times \left(\frac{12}{1000}\right)$ kip-in = 210.6 kip-in
- P (Vertical Load) = 2.0 kips

$$\mathbf{T} = \left[45.0 - \sqrt{2025 - 5.95\,(6.1P + Vh)}\right] - P$$

$$\mathbf{T} = \left[45.0 - \sqrt{2025 - 5.95\,(6.1 \times 2 + 210.6)}\right] - 2 = \underline{\underline{16.6\ \text{kips}}}$$